

**Initial Water Level Testing  
For Mountain Home  
Groundwater Advisory  
Committee 1999  
Recharge Project**

*Submitted by Daniel A. Nelson  
Water Right Agent  
Idaho Dept of Water Resources*

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Idaho Transportation Department

Mountain Home Highway District Stock Well

Mountain Home Highway District Shop Well

Leydet North Well

Leydet South Well

Hiddleston Grandmothers Well

Hiddleston Back Well

George Jones Well

## **REVIEW OF DATA**

**BY DANIEL A. NELSON**

Gary Spackman of the Idaho Department of Water Resource requested that I oversee the 1999 recharge event and perform flow measurements and water level test in 8 wells for the Mountain Home Recharge Project in 1999. This review contains a review of the data that has been collected up to May 5, 1999. Monitoring of the 8 wells will continue through 1999 to determine tendencies in the 8 wells. Shane Bendixsen and Helen Harrington of the State Office of the Idaho Department of Water Resources have assisted in the measurements and have interpreted the data that has been collected.

I have estimated that approximately 1000 acre feet of water was diverted from Canyon Creek for the Mountain Home Recharge Project in 1999. The acre foot amount comes from an average of three measurements taken during the 1999 recharge event. However, the flow of Canyon Creek decreased throughout the recharge event and these measurements were taken during the last three weeks of the five week event. Even though the first two weeks were not measured, I feel that this estimate is reasonable.

The Mountain Home Recharge Committee did an excellent job of monitoring and working with the water available to ensure that there were no problems and that the used the water available as efficiently as possible. An estimated 8 % of the water flowing down Canyon Creek was not utilized by the Recharge Committee. Special recognition should be given to both Fred Perez and Ron Leydet for their work on the system.

The water level tests performed on 8 monitoring wells was disappointing. The results of these tests were inconclusive and no discernable changes in the water levels could be seen. There did seem to some rise in the Mountain Home Highway District Stock Well, the Mountain Home Highway District Shop Well, and the Leydet North Well. However, these water level changes were probably attributable to piling or build up around the recharge sites. According to the review of the measurements by Shane Bendixsen and Helen Harrington, it seems that the amount of water that was recharged only amounted to approximately 4 % of the water in the local aquifer. In order to see dramatic change in water levels the percentage of water added to the local aquifer would have to be much higher. In speaking with local area residents and water users, it is believed that there could be a system of fissures or lava tubes within the recharge area. There is no evidence to substantiate these claims, but it could give a possible reason why water level were significantly changed in the monitoring wells.

In conclusion, it is safe to say that the recharge project was a success, even though measurable results could not be shown. A 1000 acre feet of water was recharged into the aquifer and the Mountain Home Recharge Committee did an outstanding job of controlling the water for the recharge event. I believe that the 1999 recharge event was an excellent beginning to future recharge. Through time a better understanding of the underground flow patterns should be attained allowing recharge water to be better monitored.

**ESTIMATED ANNUAL VOLUME FOR MOUNTAIN HOME RECHARGE PROJECT FOR 1999**  
**SUBMITTED BY DANIEL A NELSON - WATER RIGHT AGENT**

Two recharge events have happened in 1999. The first event began on 3/9/1999 and lasted for 3-24 hour days. The second event began on 3/19/1999 and ended 4/17/1999 for 30-24 hour days. The Mountain Home Recharge Projected recharged water for a total of 33 days in 1999. Three measurements were made on all three recharge sites and 2 measurements were made on Canyon Creek at the feeder canal diversion and after the recharge sites.

DATE MEASURED	CANYON CREEK AT FEEDER CANAL DIVERSION	SITE #1	NORTHSIDE SITE #2	SOUTHSIDE SITE #2	CANYON CREEK AFTER RECHARGE SITES
3/31/99		5.33 CFS	12.69 CFS	4.65 CFS	
4/07/99	18.70 CFS	.75 CFS	6.18 CFS	2.33 CFS	2.35 CFS
4/14/99	20.01 CFS	1.26 CFS	4.01 CFS	6.84 CFS	0.76 CFS

Below are the calculations for high flow (3/31/1999), low flow (4/07/1999), and the average flow from all three sites. To calculate the estimated volume of water recharged I multiplied the total cfs rate X 86400 seconds per day X 33 days and divided by 43560 to determine the total volume in acre feet diverted for recharge.

**HIGH FLOWS (3/31/1999):**

SITE # 1 = 5.33 CFS  
 SITE # 2 NORTHSIDE = 12.69 CFS  
 SITE # 2 SOUTHSIDE = 4.65 CFS  
 TOTAL RECHARGE DIVERSION RATE = 22.67 CFS

(22.67 CFS) (86400 SEC./DAY) (33 DAYS) / 43560 = 1484 AF OF RECHARGE AT HIGH FLOWS

**LOW FLOWS (4/07/1999):**

SITE # 1 = .75 CFS  
SITE # 2 NORTHSIDE = 6.18 CFS  
SITE # 2 SOUTHSIDE = 2.33 CFS  
TOTAL RECHARGE DIVERSION RATE = 9.26 CFS

(9.26 CFS) (86400 SEC./DAY) (33 DAYS) / 43560 = 606 AF OF RECHARGE AT LOW FLOWS.

**AVERAGE VOLUME (COMBINATION OF ALL THREE MEASUREMENTS):**

SITE # 1 = 5.33 CFS (3/31) + .75 CFS (4/7) + 1.26 CFS (4/14) / 3 = 2.45 AVE CFS  
SITE # 2 NORTHSIDE = 12.69 CFS (3/31) + 6.18 CFS (4/7) + 4.01 CFS (4/14) / 3 = 7.63 AVE CFS  
SITE # 2 SOUTHSIDE = 4.65 CFS (3/31) + 2.33 CFS (4/7) + 6.84 CFS (4/14) / 3 = 4.61 AVE CFS  
TOTAL AVERAGE RECHARGE DIVERSION RATE = 14.69 AVE CFS

(14.69 CFS) (86400 SEC/DAY) (33 DAYS) / 43560 = 962 AF AVERAGE VOLUME

**CONCLUSION:**

It is estimated that recharge from the Mountain Home Recharge Project is between 606 af to 1484 af of water. The average volume of water is 962 af of water. I estimate the actual amount of water that was recharged was fairly close to 1000 af of water.

**ESTIMATED AMOUNT OF WATER DIVERTED INTO CANYON CREEK:**

Two measurements were made on Canyon Creek at the feeder canal diversion to Mountain Home Reservoir. On 4/7/999 the measurement was 18.70 cfs and on 4/14/999 it was 20.01 cfs, for an average of 19.36 cfs (18.70 cfs + 20.01 cfs / 2 = 19.36 cfs). Below I have estimated the average volume of water diverted into Canyon Creek during the recharge effort.

AVERAGE VOLUME = (19.36 CFS) (86400 SEC/DAY) (33 DAYS) / 43560 = 1267 AF AVERAGE VOLUME

**PERCENT OF WATER USED FOR RECHARGE:**

(962 AF AVE. RECHARGE VOLUME) / (1267 AVE. CANYON CREEK VOLUME) (100) = 75.9 % OF CANYON CREEK WATER USED FOR RECHARGE.

**PERCENT OF WATER PASSING BY RECHARGE SITE:**

Two measurements were made on Canyon Creek Below the Site # 2 point of diversion. These measurements were 2.35 cfs and 0.76 cfs for an average of 1.56 cfs ( $2.35 + 0.76 / 2 = 1.56$ ). Below I have estimated the average volume of water not used in the recharge effort.

AVERAGE VOLUME = (1.56 CFS) (86400 SEC/DAY) (33 DAYS) / 43560 = 102 AF AVERAGE VOLUME

**PERCENT OF WATER PASSING BY RECHARGE SITE:**

(102 AF AVE. UNUSED WATER) / (1267 AVE. CANYON CREEK VOLUME) (100) = 8.1 % OF CANYON CREEK WATER PASSING BY SITE # 2.

**ESTIMATED STREAM LOSS:**

An estimated 75.9 % of Canyon Creek water was used for recharge and another estimated 8.1 % of Canyon Creek water was allowed to pass by Site # 2 for a total of 84 % of Canyon Creek's volume is accounted for. It is assumed that the remaining 16 % or 203 af (1267 af Canyon Creek volume X .16 = 203 af stream loss) of water was a result of stream loss. This area has a very porous soil and stream losses and local canal losses are extremely high. This amount does not seem unreasonable.

1598.00 CANYON CREEK AT OREGON TRAIL CROSSING NR MOUNTAIN HOME [KAF]

U-YR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANN
85	0.4	0.3	0.4	0.3	0.3	1.7	4.4	4.4	3.1	2.9	2.7	1.3	22.0
86	0.2	0.5	0.6	1.8	14.5	11.7	4.0	4.3	4.4	3.5	3.0	1.9	50.4
87	0.2	0.2	0.1	0.1	0.4	1.5	3.9	3.0	2.2	1.9	0.9	0.1	14.5
88	0.1	0.1	0.1	0.2	0.9	1.6	1.4	3.0	2.1	1.9	0.1	0.0	11.5
89	0.1	0.3	0.7	0.6	1.4	12.1	7.3	4.3	4.7	4.4	3.7	2.1	41.7
90	0.2	0.2	0.2	0.2	0.3	1.4	1.6	2.2	2.7	3.5	1.9	0.1	14.5
91	0.1	0.1	0.1	0.1	0.2	0.4	0.4	0.7	1.4	0.4	0.0	0.0	3.9
92	0.0	0.1	0.1	0.1	0.2	0.3	0.2	0.4	0.3	0.1	0.0	0.0	1.8
93	0.0	0.0	0.1	0.3	0.9	7.9	7.2	4.2	3.5	4.2	3.6	2.2	34.1
94	0.3	0.1	0.2	0.1	0.2	1.0	1.5	2.5	3.4	2.5	0.4	0.0	12.2
95	0.0	0.1	0.5	1.6	4.0	3.5	2.8	4.8	3.6	3.6	3.3	2.5	30.3
AVE 1985-95:	0.1	0.2	0.3	0.5	2.1	3.9	3.2	3.1	2.9	2.6	1.8	0.9	21.5

CANYON CREEKS HISTORIC FLOODS.

## MEMORANDUM

TO: Gary Spackman

FROM: Shane Bendixsen and Helen Harrington

RE: Mountain Home Managed Recharge Project  
Summary of Spring 1999 Data

DATE: May 3, 1999

### Recharge Activity

Managed recharge occurred in two episodes in early 1999. Surface water from Canyon Creek was diverted into gravel pits for three days beginning on March 9, 1999, at a continuous rate. Water was again diverted into gravel pits beginning on March 19 and continued until April 17, 1999. Total volume of water diverted into the gravel pits is estimated to be 1000 acre feet (Dan Nelson, IDWR).

### Monitoring

Water levels in eight nearby wells were monitored. Prior to managed recharge, the wells were monitored monthly for three months. Beginning on March 3, water levels were monitored weekly. A continuous recorder was installed on Well 03S06E-10DBC1 (Leydet South) well. One additional well (Larrea) was monitored as a part of the larger Mountain Home regional monitoring network. The well is located approximately one and one-half miles south-southwest of the main recharge pit. Attachment 1 shows the locations of the gravel pits and monitoring sites.

Attachment 2 shows ground water elevations prior to and following managed recharge. The contour lines reflect the generalized flow direction of the ground water (from higher elevations to lower elevations). The general direction of ground water flow is southwest and is generally the same in both illustrations.

Attachment 3 shows the hydrographs spanning the time period December 15, 1998 to April 28, 1999. The data shows the period prior to recharge through the active recharge diversions. Two wells are upgradient (Jones and MHHD Stock), while the other wells are downgradient at varying distances from the recharge sites. Only two wells (MHHD Stock and MHHD Shop) show any significant increases in ground water levels during the managed recharge. The Hiddleston-Back well showed an increase following the cessation of recharge. This increase may be a result of recharge from a ditch near the well (per Dan Nelson).

Three wells nearest downgradient from the main recharge pit (MHHD Shop, Leydet North and Leydet South) show minor short term increases ranging from one to two feet. These increases occurred approximately two to three weeks after the beginning of the longer recharge event. The upgradient Jones well, however, also shows a minor increase around the same time.

Ground water levels may have also been influenced by a number of other factors unrelated to the managed recharge. MHHD Shop and the Hiddleston Domestic wells were pumping or had been recently pumped prior to measurement on two occasions. Therefore, measurements do not reflect static levels. Additionally, seepage from Canyon Creek would also recharge the ground water. It is not possible with the existing information to determine the amount of influence the seepage loss compared to the managed recharge influence.

#### Summary

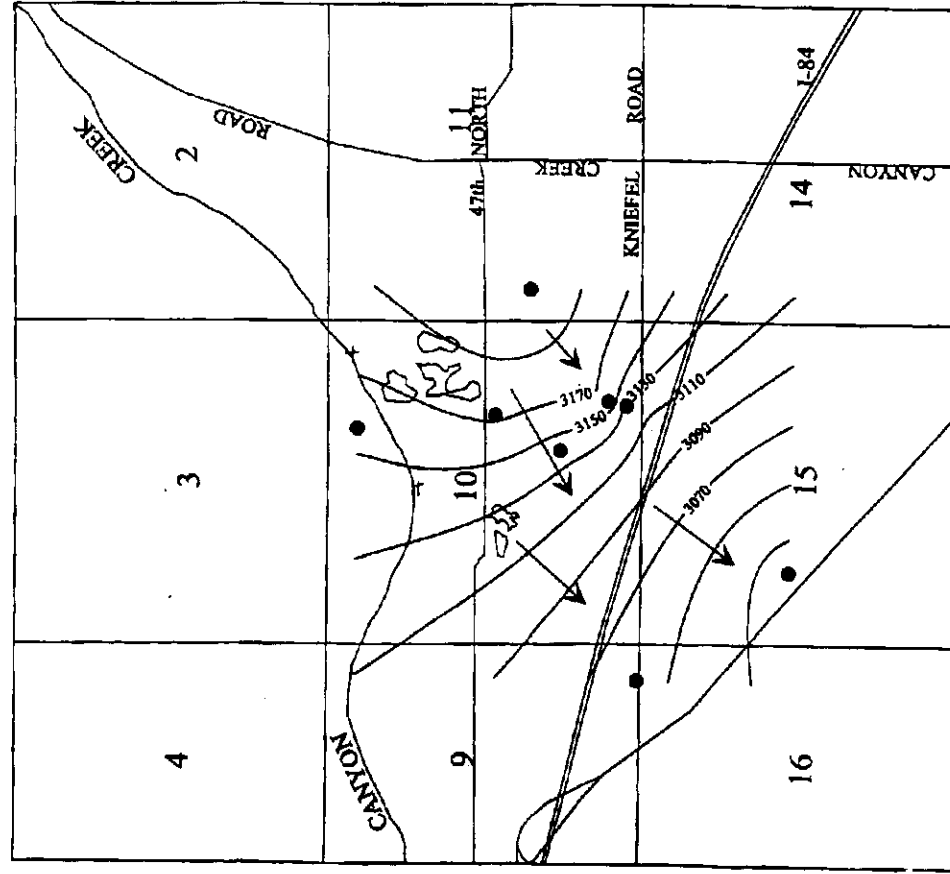
Overall, water levels did not significantly increase. Some wells even showed an overall downward trend. This can be explained several ways. Some of the recharge must have been delayed in the unsaturated zone overlying the water table. A 'lag effect' is also possible and therefore ground water levels still might increase. Underflow leaving the area would also significantly diminish the effects. Also, assuming a 20 percent specific yield, the top 200 feet of the aquifer in the one square mile around the recharge sites, contains approximately 25,000 acre feet of water already in storage. Therefore the 1,000 acre feet of recharge only amounts to approximately four percent of what was already in storage. Note that if the total thickness and extend of the aquifer are taken into consideration, the amount of recharge becomes an immeasurable amount.

Cc: Wayne Haas  
Norm Young  
Hal Anderson  
Bob Sutter  
Dan Nelson

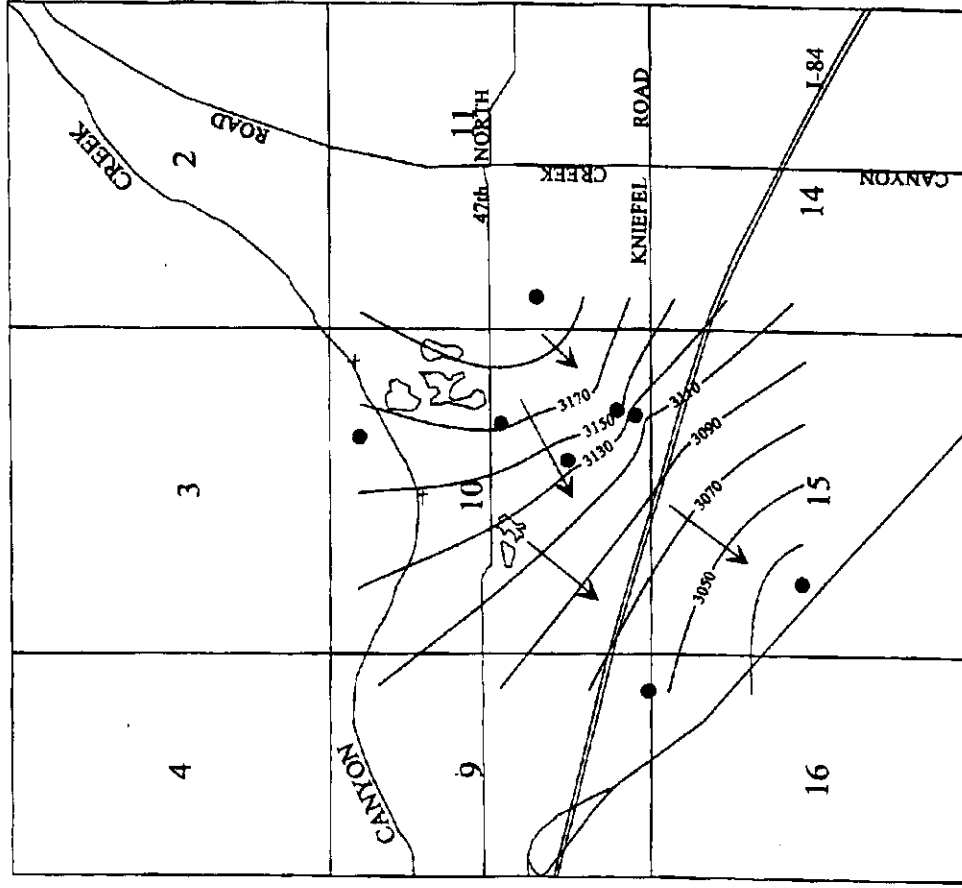
# MOUNTAIN HOME RECHARGE PROJECT

## GROUND WATER ELEVATIONS

Pre Recharge Event (2/99)



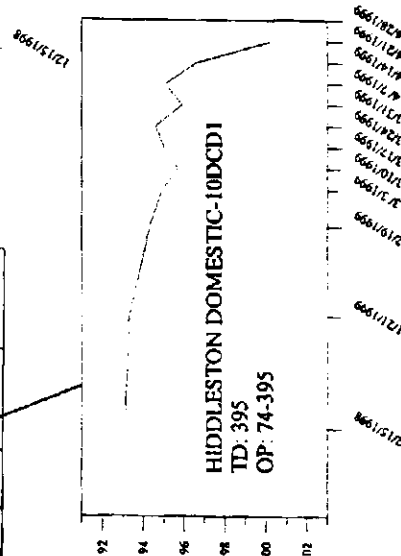
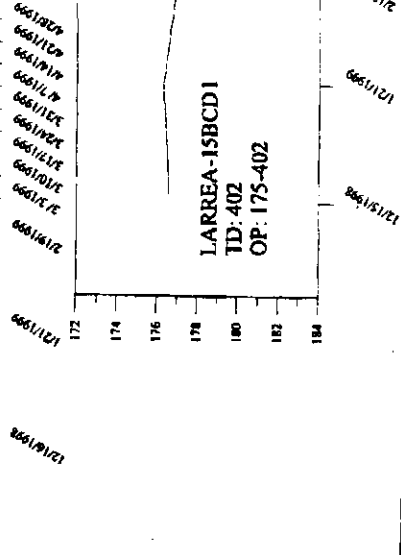
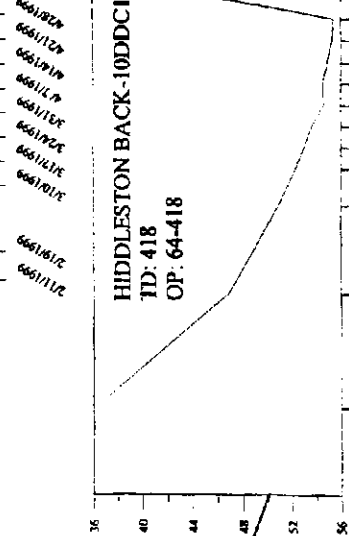
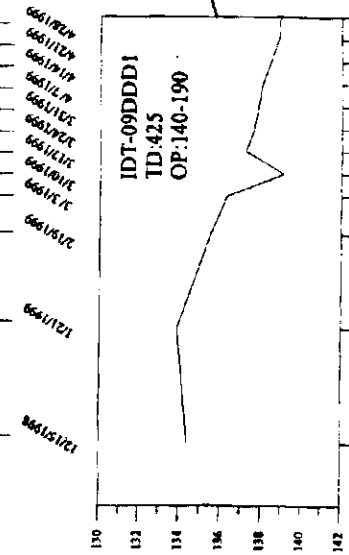
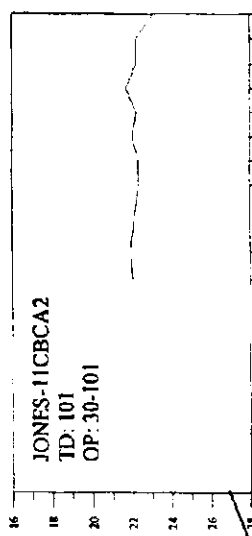
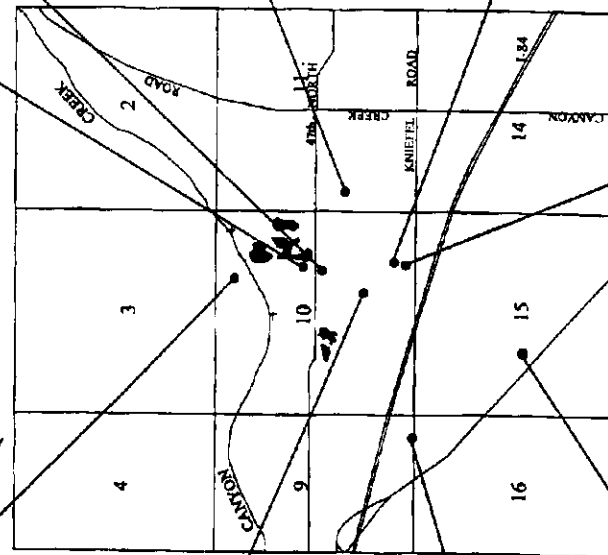
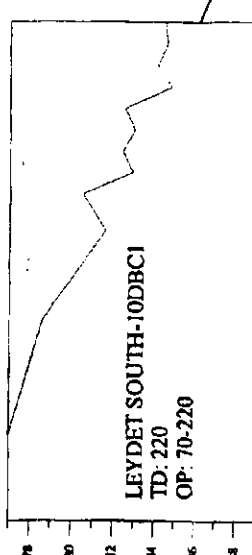
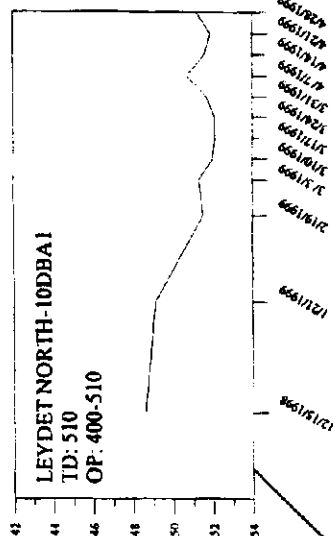
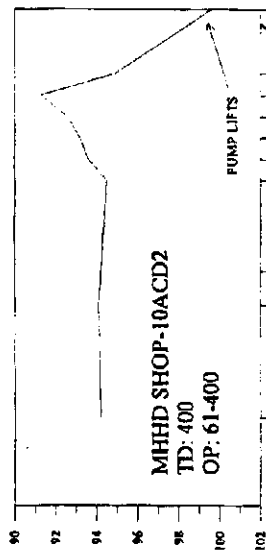
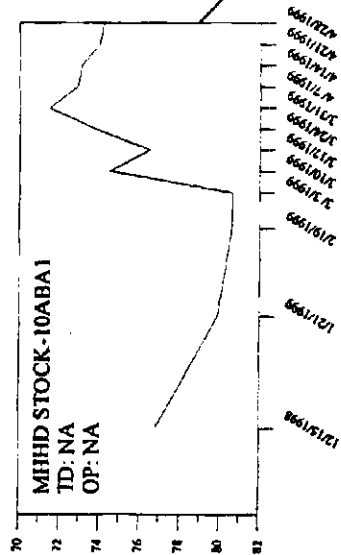
Post Recharge (4/19-22)



- MONITORING WELL LOCATION
- ← GENERALIZED FLOW DIRECTION
- GRAVEL PITS

# MOUNTAIN HOME RECHARGE PROJECT

## IDWR MONITORING SITES



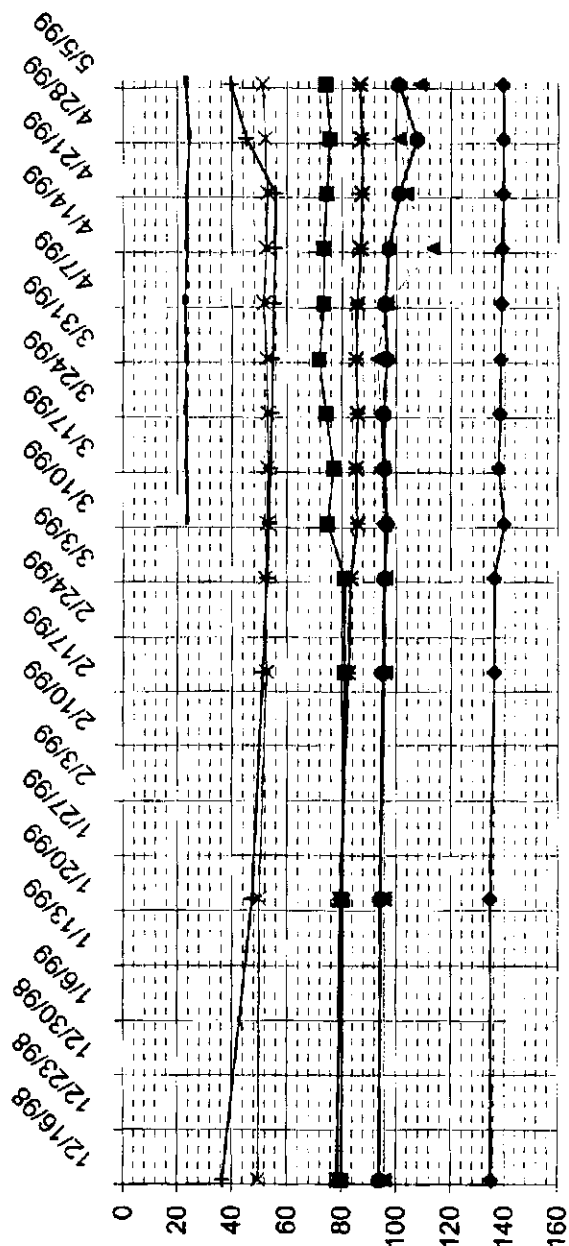
### Legend

TD: Total Depth  
OP: Interval at which well is perforated or open to the aquifer  
Left Side: Depth to water  
Base: Date measurement taken

Gravel Pit

# MOUNTAIN HOME WATER LEVELS

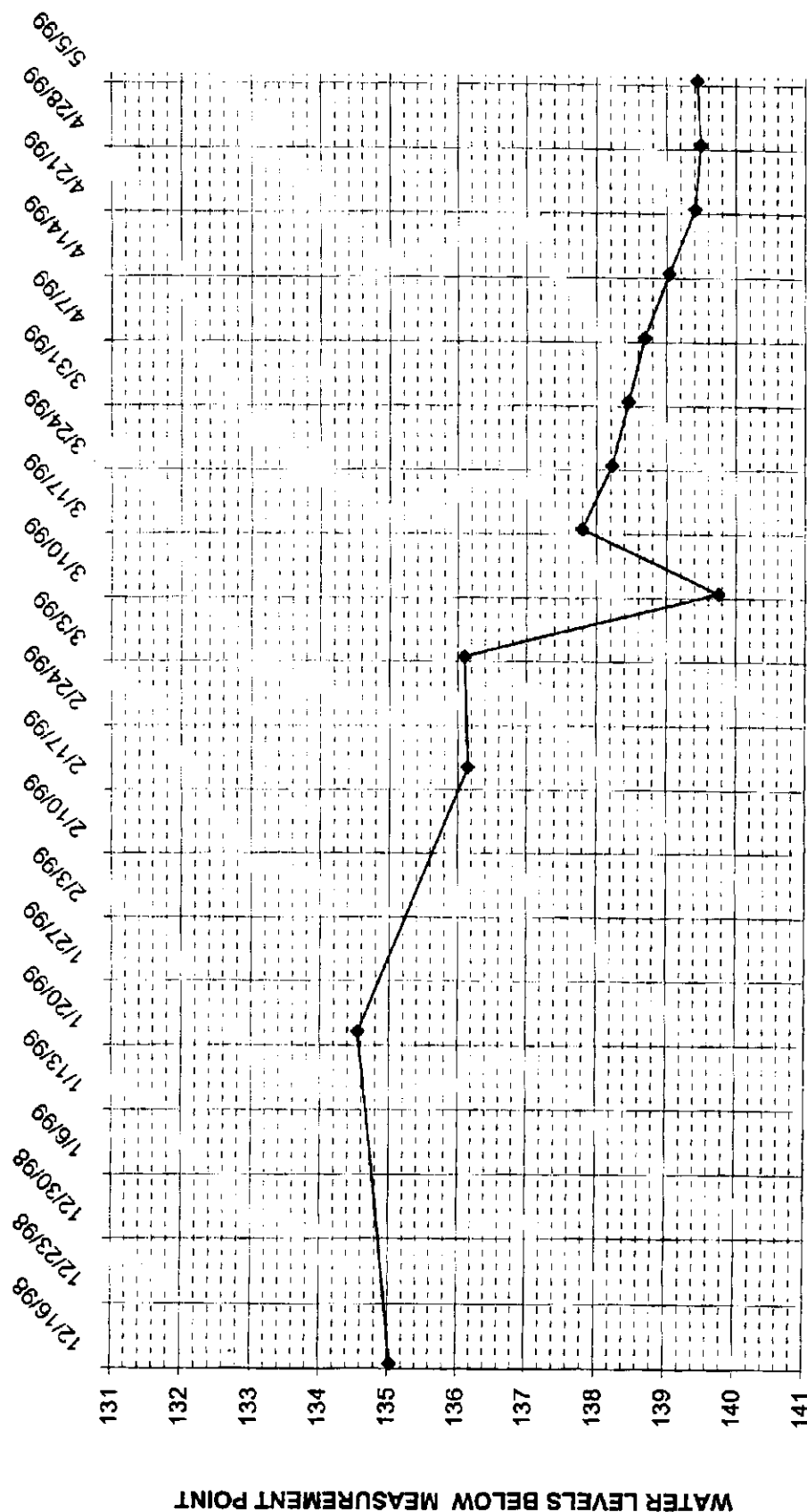
DATE MEASURED



FEET BELOW MEASUREMENT POINT

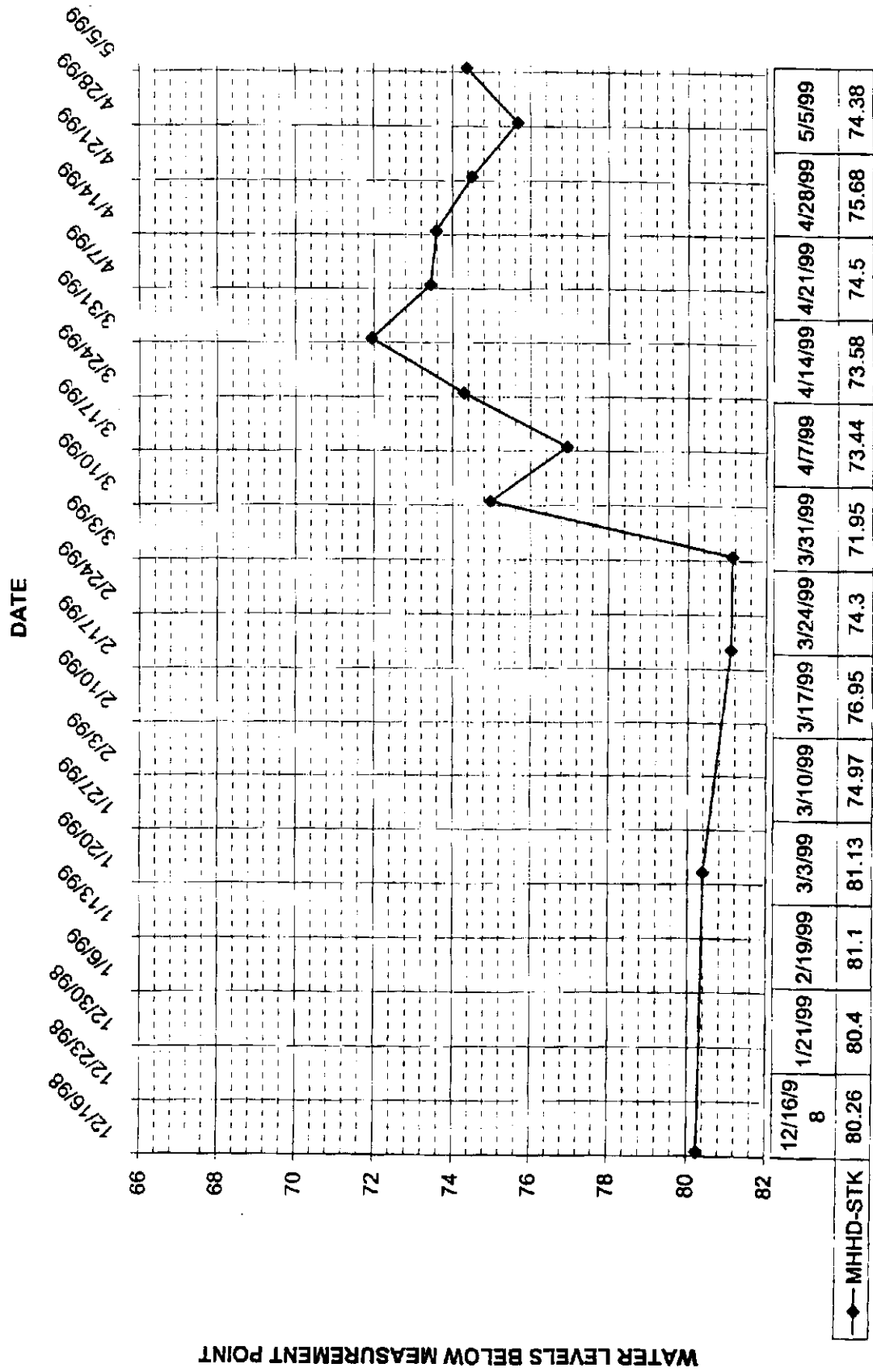
	12/16/98	1/21/99	2/19/99	3/3/99	3/10/99	3/17/99	3/24/99	3/31/99	4/7/99	4/14/99	4/21/99	4/28/99	5/5/99
ITD	135	134.6	136.2	136.1	139.8	137.8	138.2	138.5	138.7	139	139.4	139.5	139.4
MHHD-STK	80.26	80.4	81.1	81.13	74.97	76.95	74.3	71.95	73.44	73.58	74.5	75.68	74.38
MHHD-SHP	95.94	95.76	95.9	96.24	95.26	94.85	94.33	93.03	96.51	113.5	103.8	101.3	108.7
LEYDET-N	49.75	50.07	52.69	52.3	53	53.1	53.13	52.7	51.7	52.55	52.93	52.24	51.39
LEYDET-S	78.67	79.5	82.52	83.39	85.78	85.25	85.86	85.41	85.7	86.99	87.51	87.36	86.78
HID-GRAM	94.02	94.13	95.1	95.67	96.5	95.76	95.39	96.66	95.89	97.36	101	107.6	101
HID-BAC	36.77	47.39	51.37	52.82	53.53	54.1	54.63	55.03	55.38	55.76	55.87	45.37	39.76
JONES					23.75	23.51	23.28	23.44	22.98	23.45	23.49	24.38	23.35

## DATE MEASURED

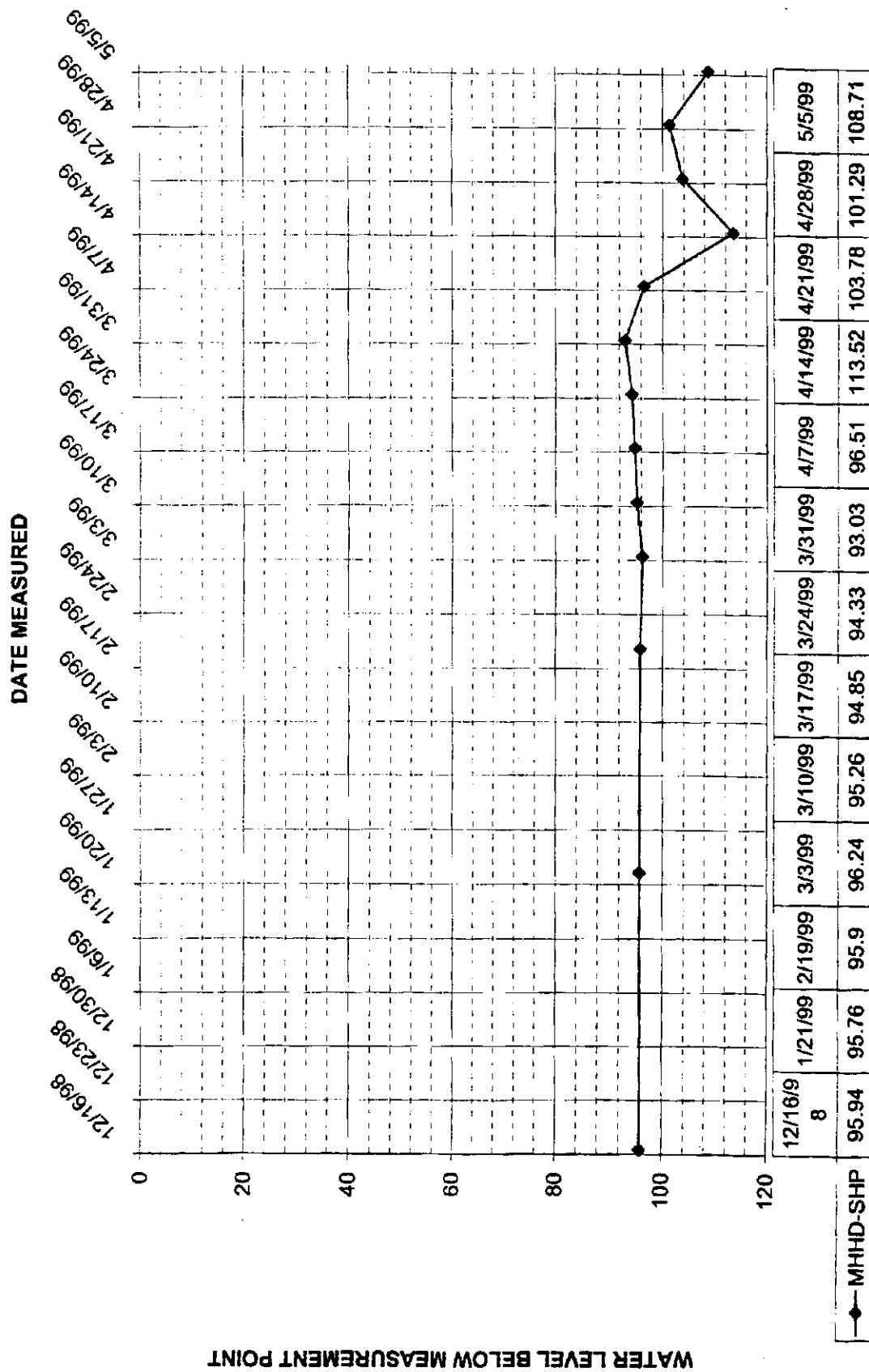


	12/16/99	1/21/99	2/19/99	3/3/99	3/10/99	3/17/99	3/24/99	3/31/99	4/7/99	4/14/99	4/21/99	4/28/99	5/5/99
8													
135.04	134.55	136.15	136.1	139.75	137.8	138.22	138.46	138.69	139.04	139.41	139.49	139.44	

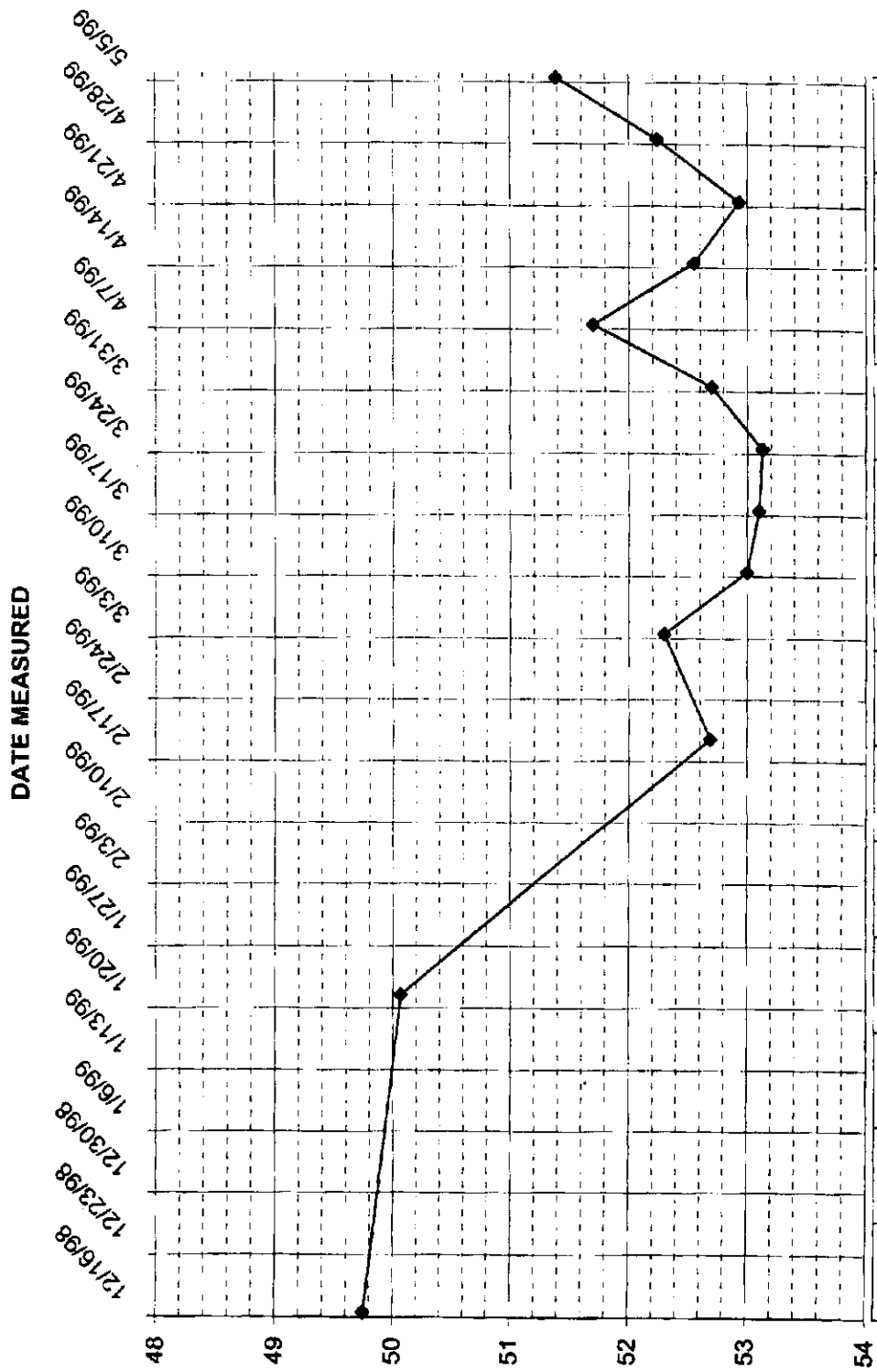
# MOUNTAIN HOME HIGHWAY DISTRICT STOCKWATER WELL WATER LEVEL TEST



# MOUNTAIN HOME HIGHWAY DISTRICT SHOP WELL WATER LEVELS



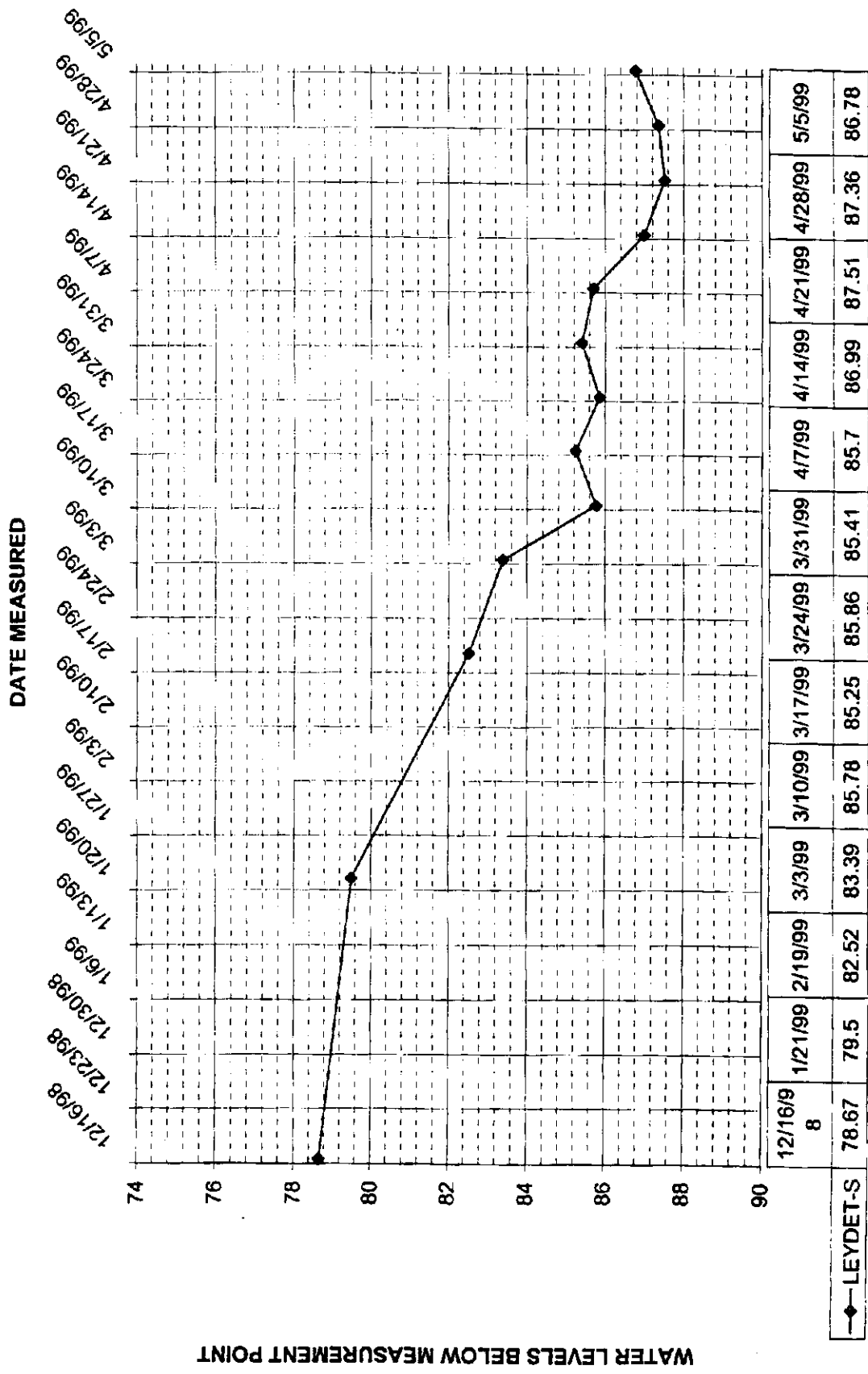
# LEYDET NORTH WELL WATER LEVEL TEST



WATER LEVELS BELOW MEASUREMENT POINT

LEYDET-N

# LEYDET SOUTH WELL WATER LEVEL TEST

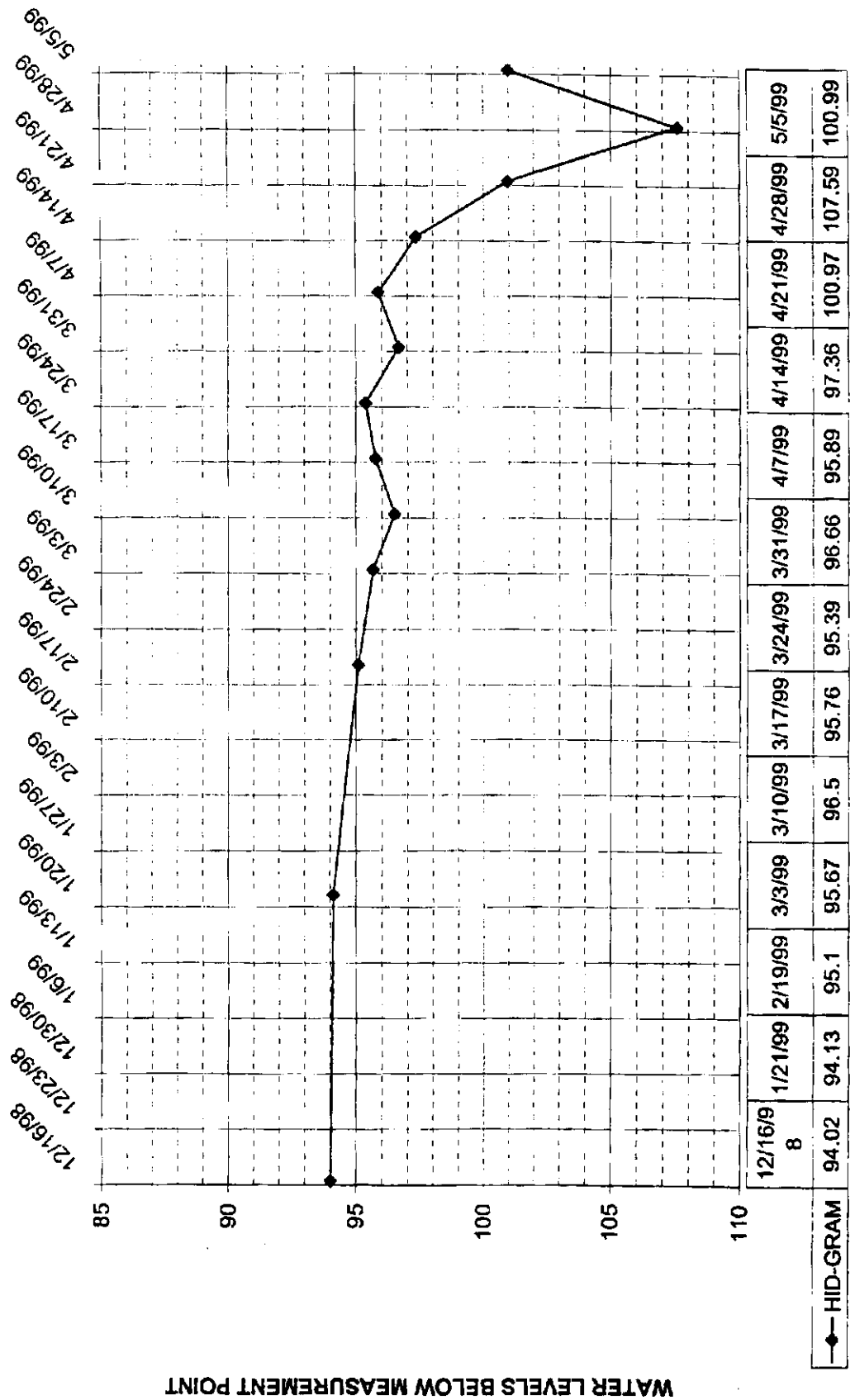


WATER LEVELS BELOW MEASUREMENT POINT

LEYDET-S

# HIDDLESTON GRAMOTHER'S WELL WATER LEVEL TEST

DATE MEASURED



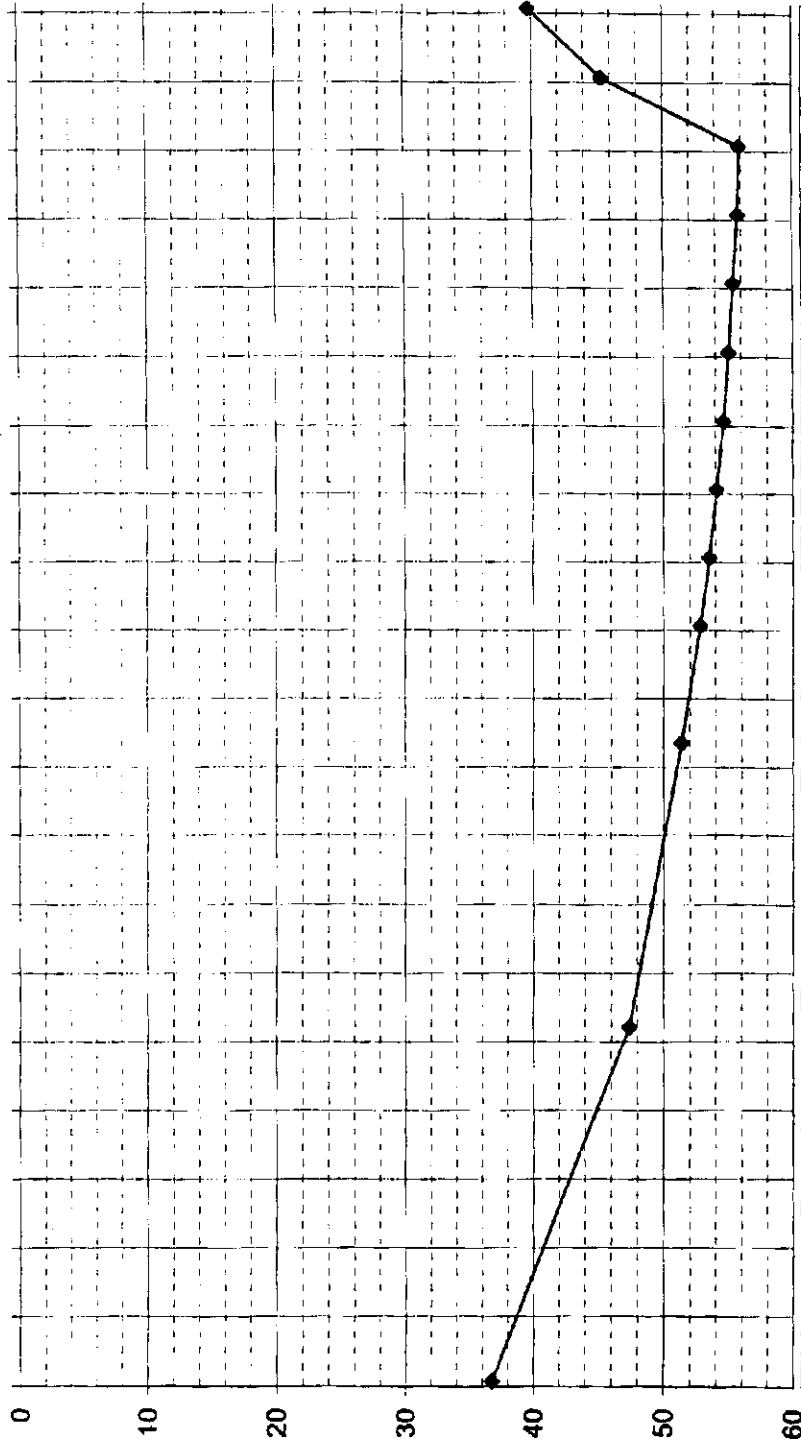
WATER LEVELS BELOW MEASUREMENT POINT

—●— HID-GRAM

# HIDDLESTON BACK WELL WATER LEVEL TEST

DATE

12/16/98 12/23/98 12/30/98 1/6/99 1/13/99 1/20/99 1/27/99 2/3/99 2/10/99 2/17/99 2/24/99 3/3/99 3/10/99 3/17/99 3/24/99 3/31/99 4/7/99 4/14/99 4/21/99 4/28/99 5/5/99

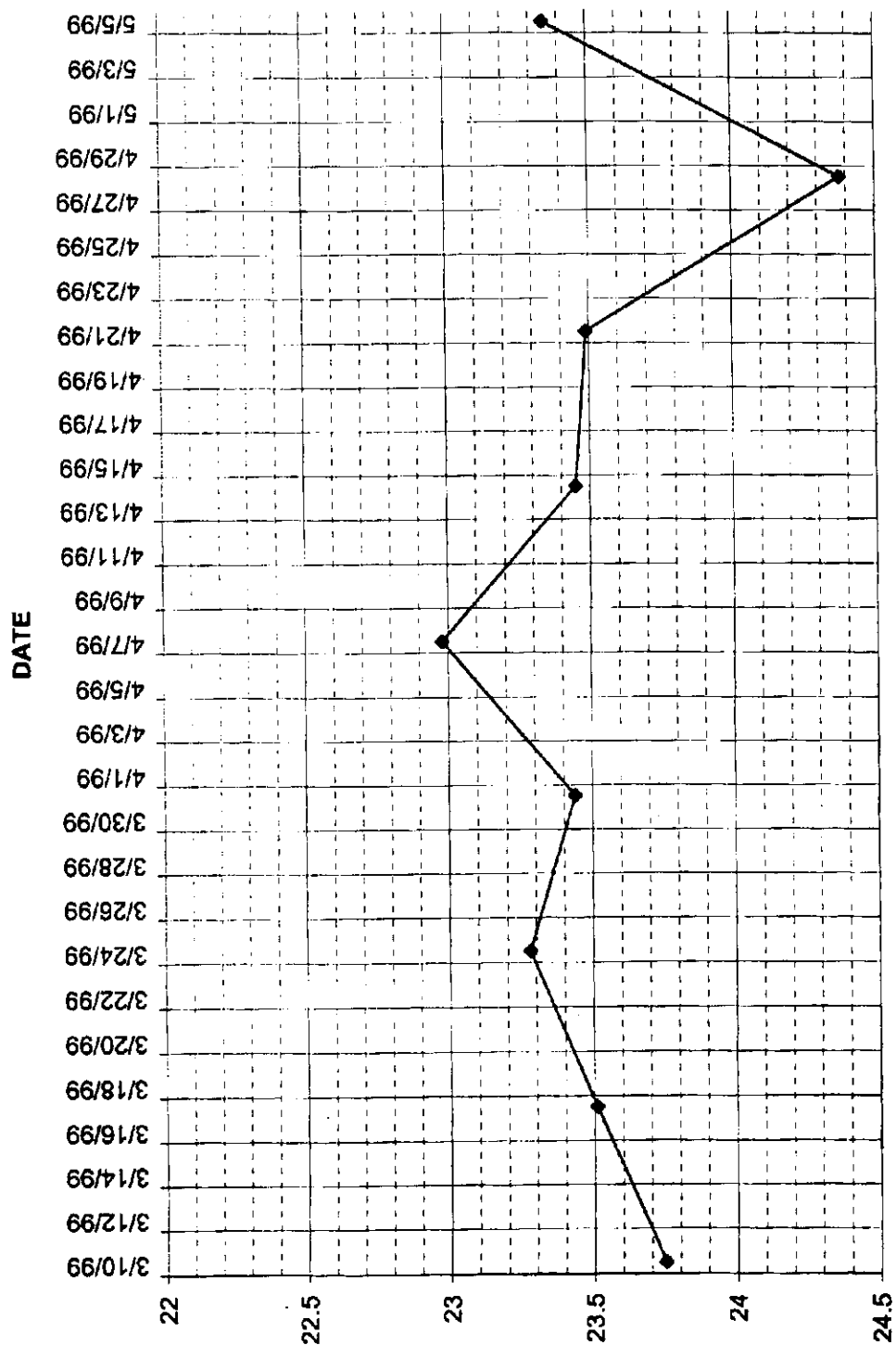


WATER LEVELS BELOW MEASUREMENT POINT

—●— HID-BAC

12/16/98	1/21/99	2/19/99	3/3/99	3/10/99	3/17/99	3/24/99	3/31/99	4/7/99	4/14/99	4/21/99	4/28/99	5/5/99
8	47.39	51.37	52.82	53.53	54.1	54.63	55.03	55.38	55.76	55.87	45.37	39.76

# GEORGE JONES WELL WATER LEVEL TEST



DATE	WATER LEVEL (ft)	DATE	WATER LEVEL (ft)
3/10/99	23.75	4/28/99	24.38
3/17/99	23.51	5/5/99	23.35
3/24/99	23.28		
3/31/99	23.44		
4/7/99	22.98		
4/14/99	23.45		
4/21/99	23.49		
4/28/99	24.38		
5/5/99	23.35		